

to produce an alloy or metallic substance that possesses the following properties, viz :

- 1st. It must be non-magnetic.
- 2d. It must resist rusting and oxidation.
- 3d. It must be permanently elastic.

These properties he has obtained in an alloy of palladium.

By the combination of two alloys containing different quantities of palladium, Mr. Paillard has succeeded in obtaining accurate compensation for changes of temperature in the balance wheels of his watches.

On the Gramophone.

Mr. Emil Berliner, of Washington, D. C., has recently made improvements in the speaking phonograph that, it would seem, will probably bring this instrument into every-day commercial use. These inventions are of such a character as, possibly, to a great extent, to render phonography, or short-hand reporting, one of the lost arts.

There have been two causes for the failure of Mr. Edison's phonograph to come into extensive use. These are briefly :

1st. The perishable nature of the phonogram record, which, being made on a sheet of tin-foil, was capable of reproducing the original sound a limited number of times only.

2d. The inability of the phonograph, as originally constructed, to correctly reproduce the sounds spoken into it. The pitch or tone was correctly reproduced, provided the point attached to the diaphragm of the receiving instrument was moved over the phonogram-record at the same velocity that it had while in the receiving instrument. The quality of the tone, on the preservation of which the ability to distinguish the speaker's voice depends, could not, however, be obtained to the extent a practical instrument demands. This arises not only from the fact that the original instrument failed to correctly impress on the phonogram-record the relative intensities of the over-tones, on which the quality depends, but also on the fact that the receiving instrument was unable, from the relative positions these impressions bore to the surface of the phonogram-record, to always correctly reproduce them.

These difficulties Mr. Berliner has, to a very great extent, overcome in an instrument called by him the gramophone.

The direction in which these improvements have been made is mainly in the manner in which the receiving diaphragm of the instrument is caused to leave an impression of its movements on the phonogram-record. In the Berliner instrument, unlike the original Edison instrument, the to-and-fro movements of the diaphragm are received by the plate in a direction parallel to its surface, and not in a direction at right angles thereto. By this change the movements are recorded as a sinuous line of even depth, instead of a sinuous line of varying depths.

It results from this difference that the resistance offered by the plate to the free movements of the transmitting diaphragm is reduced to a mini-

mum, thus permitting much greater accuracy of the record received. At the same time the point attached to the receiving diaphragm has a positive motion in both directions, and can thus more correctly reproduce the characteristic quality of the spoken words.

In any phonogram-record made in a direction at right angles to the record surface, the fact that the resistance to impression does not increase in the same proportion as the depth of the impression will prevent the record from agreeing closely with the original tones. Loud tones must therefore fail to impress their characteristic quality on the phonogram-record, as correctly as more feeble tones.

Mr. Berliner prepares his receiving surface as follows : A plate of glass is covered with a layer of printers' ink, and then held in the smoky flame of a coal oil lamp and covered with a uniform layer of soot. On the surface thus prepared the stylus or point attached to the transmitting diaphragm, makes its record of a uniform depth. It then only remains to fix the record so obtained. This is accomplished by the simple expedient of flowing the plate with any ordinary quick-drying varnish. From this plate the sound can be directly reproduced, or a copy of it can be made on any desired metal.

There are three ways in which the reproduction may be made, viz :

1st. By the simple process of mechanical engraving.

2d. By chemical deposition.

3d. By photo-engraving.

This latter process is preferred by the inventor, the chromo-gelatine process being generally adopted.

The Committee on the Michaux Legacy presented a report, accompanied by the following resolution, which was, on motion, adopted :

“Resolved, That the sum of \$200 be expended under the supervision of the Michaux Committee, for the expenses of lectures of Prof. Rothrock, to be delivered in the Chapel of the University of Pennsylvania.”

The committee appointed October 21, 1887, to examine into the scientific value of the newly invented language, Volapük, and to report thereon, presented its report, which, after discussion, was, on motion of Mr. Winsor, made the special order for the next meeting of the Society, and the Secretaries were requested to have it printed and distributed among the resident members for inspection.

And the Society was adjourned by the President.